



The Future of Analog IC Technology®

EV3306-G-00A

700kHz Synchronous Boost WLED Driver Evaluation Board

DESCRIPTION

The MP3306 is a step-up converter designed for driving white LEDs from 3V to 12V power supply. The MP3306 uses current mode, fixed frequency architecture to regulate the LED current, which is measured through an external high-side current sense resistor. The low 202mV feedback voltage and synchronous rectification reduces power loss and improves efficiency.

The MP3306 is turned off if an over-voltage condition is present due to an open circuit condition. The output disconnect feature allows the output to be completely discharged. The MP3306 includes under-voltage lockout, current limiting, output short protection and thermal overload protection.

The MP3306 is available in small 12-pin QFN (2mm x 2mm) package.

ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Value	Units
Input Voltage	V_{IN}	3-12	V
Output Voltage	V_{out}	<30	V
LED String		1	
LED Current	I_{LED}	20	mA

FEATURES

- 3V~12V Input Voltage
- Analog Dimming and PWM Dimming
- Output-to-Input Disconnect in Shutdown Mode
- Programmable Open Load Shutdown
- Output Short Protection
- Low 202mV Feedback Voltage with +/-3% accuracy
- UVLO, Thermal Shutdown
- Available in 2mm x 2mm QFN12 Package

APPLICATIONS

- Smart Phone, MID, PDA
- Digital Still Cameras
- Small LCD Displays

All MPS parts are lead-free, halogen free, and adhere to the RoHS directive. For MPS green status, please visit MPS website under Quality Assurance.

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The image displays two views of the MP3306 Demo Board. The left view shows the top of the green PCB, featuring the MP3306 converter, various capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100), resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100), and a 7-pin header labeled VIN, GND, EN, and DIM. The right view shows the bottom of the board, featuring a large diagonal trace and several through-hole components.

(L x W x H) 5.0cm x 4.6cm x 0.46cm

Board Number	MPS IC Number
EV3306-G-00A	MP3306EG

The schematic diagram illustrates a boost converter circuit using the MP3306 IC. The circuit is powered by a VIN input and includes an enable (EN) pin and a dimming (DIM) pin. The input stage consists of a 4.7uF/25V capacitor (C1) and a 10uH, 1.14A inductor (L1). The MP3306 IC is configured with its IN pin connected to the input, VCC pin connected to a 1uF/10V capacitor (C4), EN pin connected to the EN input, and PWMI pin connected to a 100k resistor (R1) and a 100k resistor (R3). The PWMO pin is connected to a 10k resistor (R9) and a 0.47uF/25V capacitor (C8). The output stage includes a 10uF/25V capacitor (C7) and a 10k resistor (R9). The output voltage (Vout) is measured across the LED+ and LED- load. The circuit also includes a 10nF capacitor (C6) and a 10k resistor (R5) connected to the BST pin, and a 10k resistor (R6) and a 10k resistor (R7) connected to the OUT pin. A diode (D1) is connected to the FB pin, and a 10k resistor (R8) is connected to the GND pin.

EV3306-G-00A BILL OF MATERIALS

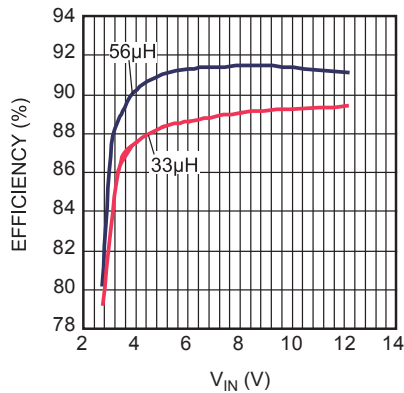
Qty	Ref	Value	Description	Package	Manufacturer	Part Number
1	C1	4.7 μ F	Ceramic capacitor, X5R, 16V	0805	TDK	C2012X5R1C475K
2	C2, C9	NC	Ceramic capacitor	0805		
2	C3, C5	NC	Ceramic capacitor	0603		
1	C4	1 μ F	Ceramic capacitor,X5R, 6.3V	0603	muRata	GRM188R60J1105KA01D
1	C6	10nF	Ceramic capacitor,25V	0603	muRata	GRM188R71E103JA01D
1	C7	1 μ F	Ceramic capacitor,X7R, 25V	0805	TDK	C2012X7R1E105K
1	C8	0.47 μ F	Ceramic capacitor,X7R, 25V	0805	muRata	GRM21BR71E474KA01L
1	R1,R3	100k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07100KL
3	R2, R5, R10	0	Film resistor, 1%	0603	Yageo	RC0603FR-070L
3	R4, R7, R11	NC	resistor	0603		
1	R6	10 Ω	Film resistor, 1%	0805	Yageo	RC0805FR-0710RL
1	R8	200k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-07200KL
1	R9	10k Ω	Film resistor, 1%	0603	Yageo	RC0603FR-0710KL
1	JP1	NC				
2	JP2, JP3	Short				
1	D1	NC		SMD		
1	L	10 μ H	Rdcr=59m Ω , Isat=1.14A	SMD	TOKO	D63LCB-A921CY- 100M=P3
1	U1	MP3306		QFN12, 2mm*2mm	MPS	

EVB TEST RESULTS

Performance waveforms are tested on the evaluation board.

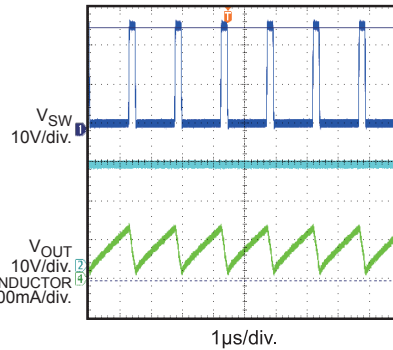
VIN=5V, VEN=5V, 8 LEDs in series, 20mA, unless otherwise noted.

Efficiency

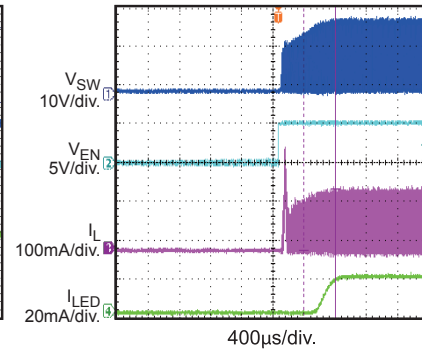


Steady State

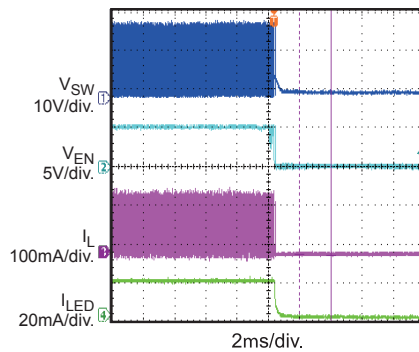
VIN = 3V



EN Startup

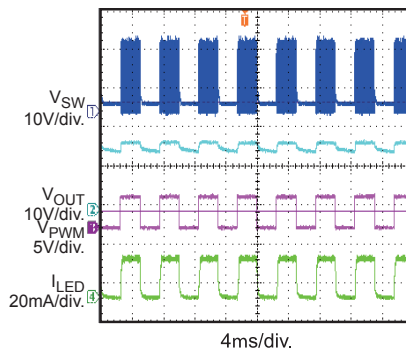


EN Shutdown



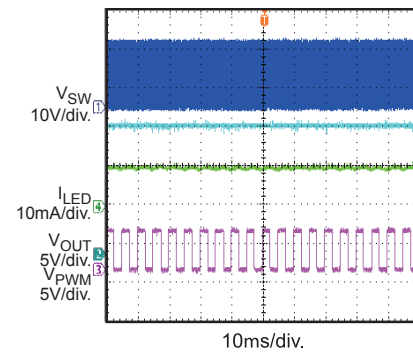
PWM Dimming

fPWM = 200Hz, D = 50%



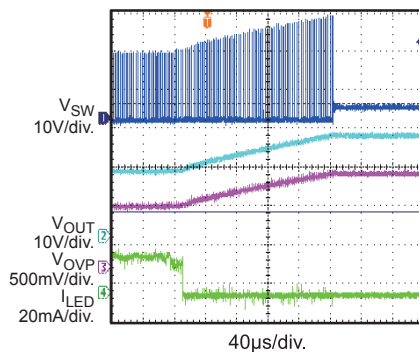
Analog Dimming

fPWM = 200Hz, CPWMO = 470nF, D = 50%



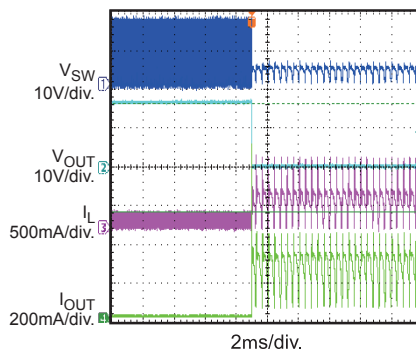
Open LED Protection

Open LED @ Working



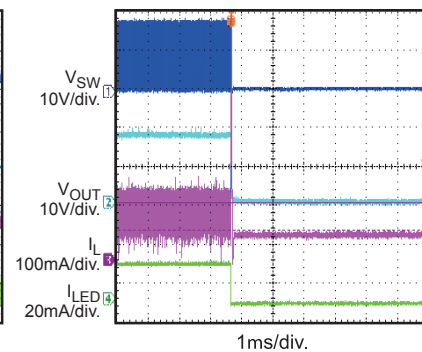
Short LED Protection

Short LED+ to LED-



Short VOUT to GND Protection

Short VOUT to GND



PRINTED CIRCUIT BOARD LAYOUT

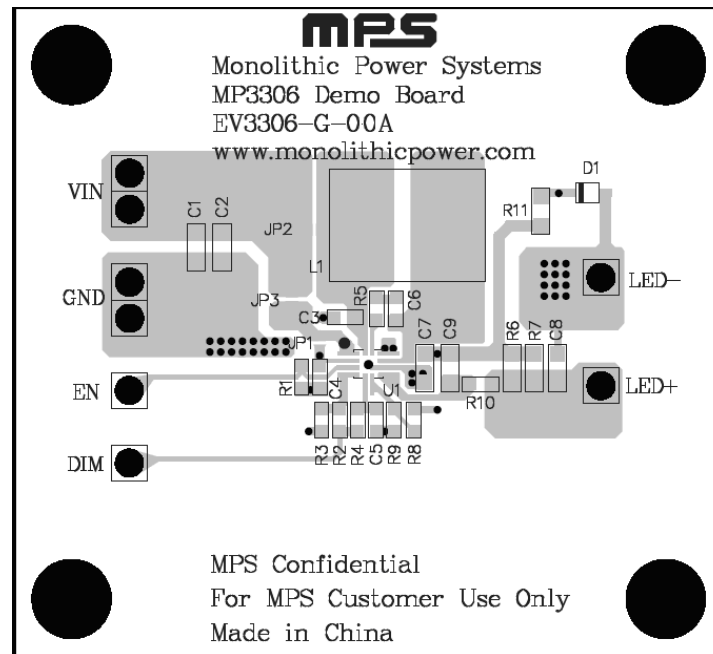


Figure 1—Top Layer

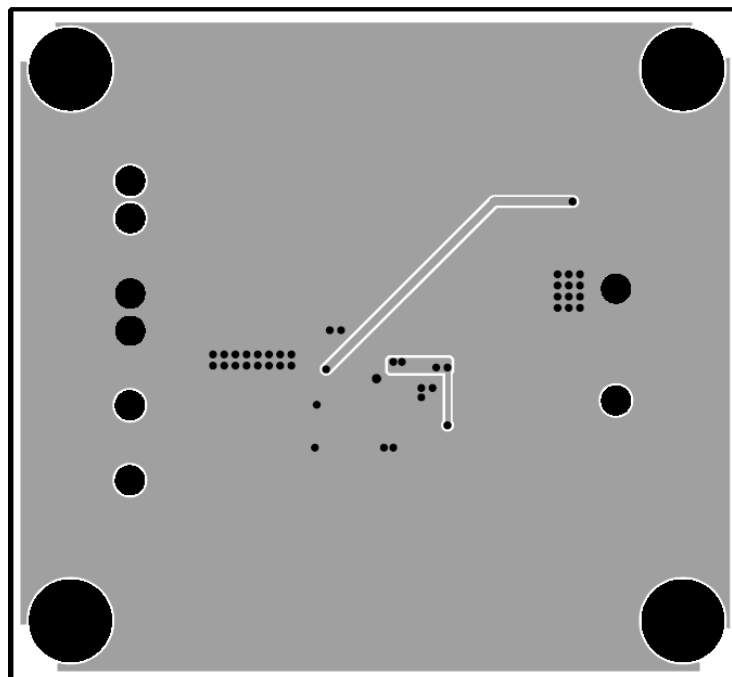


Figure 2—Bottom Layer

QUICK START GUIDE

1. Connect the positive and negative terminals of the power supply (3V ~ 12V) to the VIN and GND pins on the EV board, respectively.
2. LED string is connected to LED+ and LED- terminal respectively;
3. Drive EN pin high to enable the MP3306.
4. The DIM terminal is used for Analog/PWM dimming. When LPF capacitor is place at the PWO pin, MP3306 works in analog dimming mode by filtering the input PMW pulse. When PWM pin is float, MP3306 works in PWM dimming mode.
5. The LED current is set by the resistor at FB pin.
6. MP3306 has a N-channel MOS, which is used to accomplish short Vout to GND protection and disconnecting Vout from Vin at shutdown mode. if don't need this function, it can be disabled by short the JP2.

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